

1 GENERAL

1.1 RELATED WORK

.1	Basic Electrical Materials and Methods	Section 26 05 01
.2	Wires and Cables	Section 26 05 21
.3	Conduits	Section 26 05 34
.4	Outlet Boxes and Fittings	Section 26 05 32

1.1 GENERAL REQUIREMENTS

- .1 Scope of this section is to provide a complete conduit pathway system c/w cables which terminates at IT/Security backboard, as shown on drawings.
- .2 The pathway system is a combination of conduit and J hook supports consisting of terminal cabinets, conduits, cabling, outlet boxes, floor boxes, pull boxes, coverplates, sleeves and caps, and miscellaneous material to complete system. Open wiring within suite walls will be acceptable with properly rated cable.
- .3 Pathways are to be provided for CCTV, Data, Metasys, Pegasys (card access) Public Address, and Intrusion alarm systems.

2 INTRUSION ALARM

2.1 Field devices and cabling:

General cable and field device requirements:

- .1 Use premium quality (e.g. Belden) stranded cables.
- .2 All cables shall be run in conduit.
- .3 No cable splices are accepted.
- .4 All status changing field devices shall have DEOL (Double End of Line) supervision.
- .5 All field device terminations and connections must be soldered.
- .6 All cables shall be uniquely and clearly labelled on both sides of the run. Labels shall be permanent and not be susceptible to disconnection from the cable if exposed to thermal or mechanical influence.
- .7 All cables shall be labelled in ascending order in clockwise direction relatively to the floor plan. The labelling sequence starts at the device installed by the primary entrance to the building or partition.
- .8 An as-built indicating all cable runs and identifying the cables shall be submitted as well as the system layout diagram created with accordance to manufacturer's

design specifications.

2.2 Arming Station Provisions

- .1 An arming station consists of a card access card reader, an intrusion alarm keypad enclosed inside a universal guard.
- .2 Arming stations shall always be installed on the secure side of partitions.
- .3 An arming station shall provide for a “Stay” and “Away” indication if applicable to a partition
- .4 Arming station devices shall be installed 48” from the floor level to centre to meet the accessibility requirement, and not more than 6” apart.
- .5 22AWG-6c cable shall be used.

2.3 Door Provisions

- .1 Any door contact cabling shall be recessed at any transition point from the wall, ceiling, basement, etc.
- .2 22AWG-4c cable shall be used for each door switch connection.

2.4 Motion Detection Provisions

- .1 All interior spaces with windows, glass walls, or other possible points of entry shall be protected by motion detection devices.
- .2 Motion detection devices shall be installed to have at least 20% of detection zones overlapping.
- .3 Refer to drawings for location of devices.
- .4 22AWG-6c cable shall be used for each motion sensor connection.

3 CARD ACCESS SYSTEM

3.1 Head End

Johnson Controls Cardkey/Pegasys platform hardware shall be used.

3.2 Field Devices and Cabling:

General cable and field device requirements:

- .1 Use premium quality (e.g. Belden) stranded cables
- .2 All cables shall be run in conduit
- .3 No cable splices are accepted

- .4 All status changing field devices shall have DEOL (Double End of Line) supervision
- .5 All field device terminations and connections must be soldered
- .6 All cables shall be uniquely and clearly labelled on both sides of the run. Labels shall be permanent and not be susceptible to disconnection from the cable if exposed to thermal or mechanical influence.
- .7 All cables shall be labelled in ascending order in clockwise direction relative to the floor plan. The labelling sequence starts at the device installed by the primary entrance to the building or partition.
- .8 An as-built indicating all cable runs and identifying the cables shall be submitted as well as the system layout diagram created with accordance to Cardkey/Pegasys design specifications.

3.3 Door Provisions

- .1 Provide cabling for an electric locking device, a reader, a door position switch, and a request-to-exit motion sensor.
- .2 Each emergency egress door shall have a local vandal-proof audible notification device energized when an emergency egress protocol is used. The audible notification device signal shall be only cancelled from the centralized monitoring station.
- .3 All card readers shall be installed 36" from the floor level to centre.

4 CCTV SYSTEM

4.1 Head End

CCTV system shall be provided by The City. Electrical Contractor is responsible to provide cabling and terminate all connections in Janitor Room IT rack.

4.2 Field Devices and Cabling:

- .1 Provide rough in for 5 CCTV, POE cameras, as per drawings.
- .2 All cabling shall be CAT6.
- .3 Provide 1800mm (72") slack for all cables in Janitor Room termination point.
- .4 Provide 150 mm (6") slack for each CCTV camera rough in location in a 4x4" environmental junction box.
- .5 Provide printed labeling for all CCTV cables.
- .6 Perform continuity test for all CCTV cables.

END OF SECTION

APPENDIX A – Integration of Automated Door Operators and Card Access System

Integration of Automated Door Operators and Card Access

Sequence of operation and functional description:

An automated door operator system installed on a door controlled by card access system should meet the following requirements:

- Power to electrical locking hardware (electric strikes or electromagnetic locks) is always supplied by card access system
- Door operator main unit is always installed on the interior (protected) side of the door
- Interior (protected side) door operator actuator button or activation sensor is always active and sends a request-to-exit signal to card access system upon receiving which the card access system unlocks the door and sends an activation signal to the automated door operator system
- Exterior (unprotected side) door operator actuator button or activation sensor is active only when access to the door is validated by card access system. The actuator then can send a request-to-exit signal to the card access system upon receiving which the card access system unlocks the door and sends an activation signal to the automated door operator system
- If a door doesn't have an intrusion alarm door position switch and the installation of a door operator will complicate or make the installation of a switch impossible in the future, the switch installation is to be included in the door operator installation scope of work

Scope of work:

The afore mentioned integration can be achieved by installing necessary cables to card access controllers and devices and connecting a series of dedicated relay modules.

There are can be two integration scenarios (refer to "Door Operator and CA integration" diagrams 1 and 2) :

1. The existing card access system has spare inputs for integration with automated door operator system.
In this case the Contracted Services Branch contractor should do the following:
 - a. Supply and install two cables A and R from the door operator module to the card access controller enclosure indicated by the Tech Shop.
 - b. Connect cable A to the activation input of the door operator. Connect cable R to the output of the interior door actuator device.
 - c. Supply and install a relay module, which upon validating an access request, will enable the exterior door actuator device
2. The existing card access system does not have spare inputs for integration with automated door operator system.
In this case the Contracted Services Branch contractor should do the following:
 - a. Supply and install a jumper cable from the interior actuator device to the indicated by the Tech Shop request-to-exit device (usually motion sensor). Disconnect a pair of

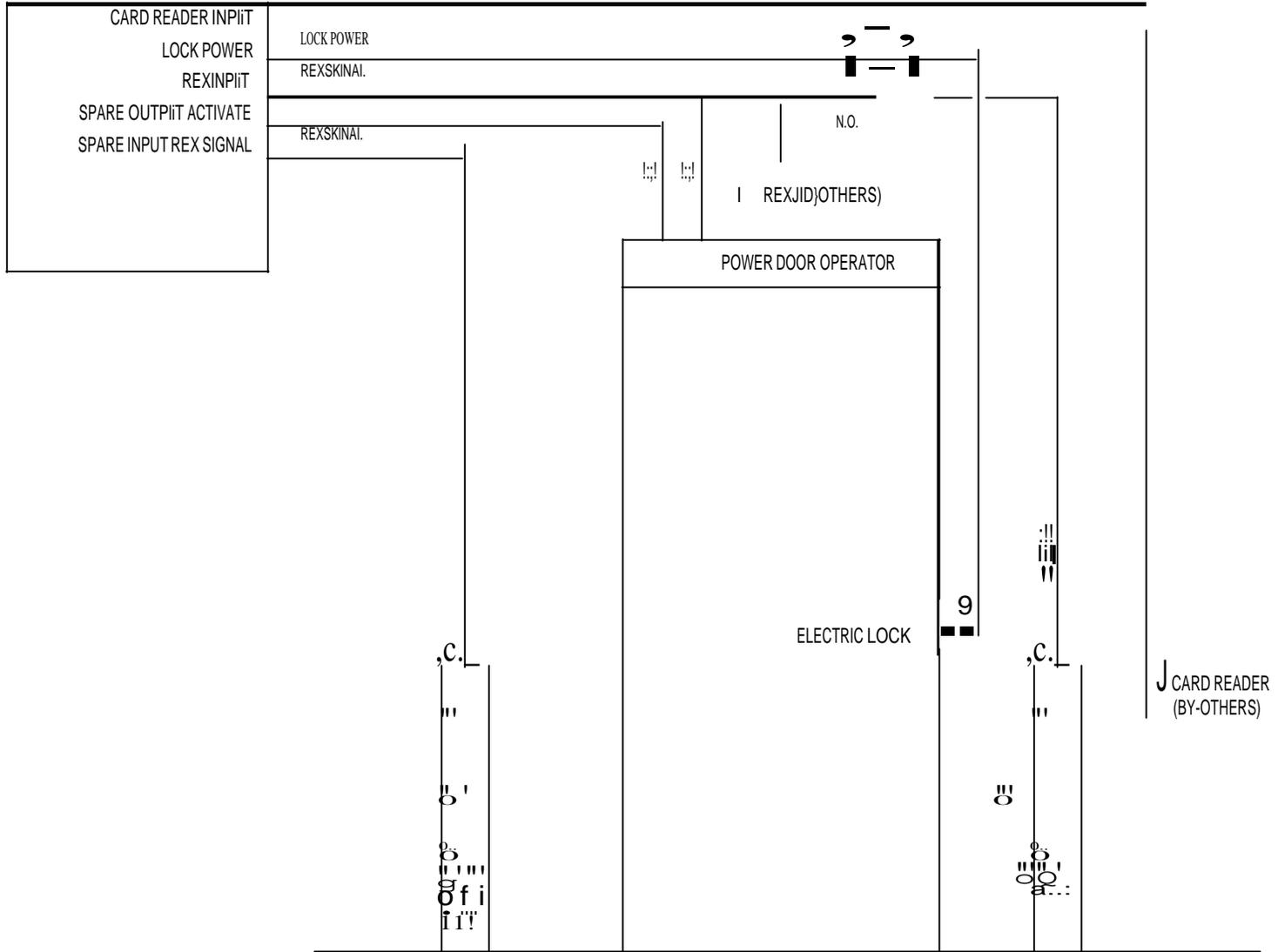
March 1, 2013

**SPECIFICATION PPD 281328
SECURITY ACCESS COMPONENTS**

request-to-exit signal wires from the device and connect them in parallel to the outputs of interior actuator device.

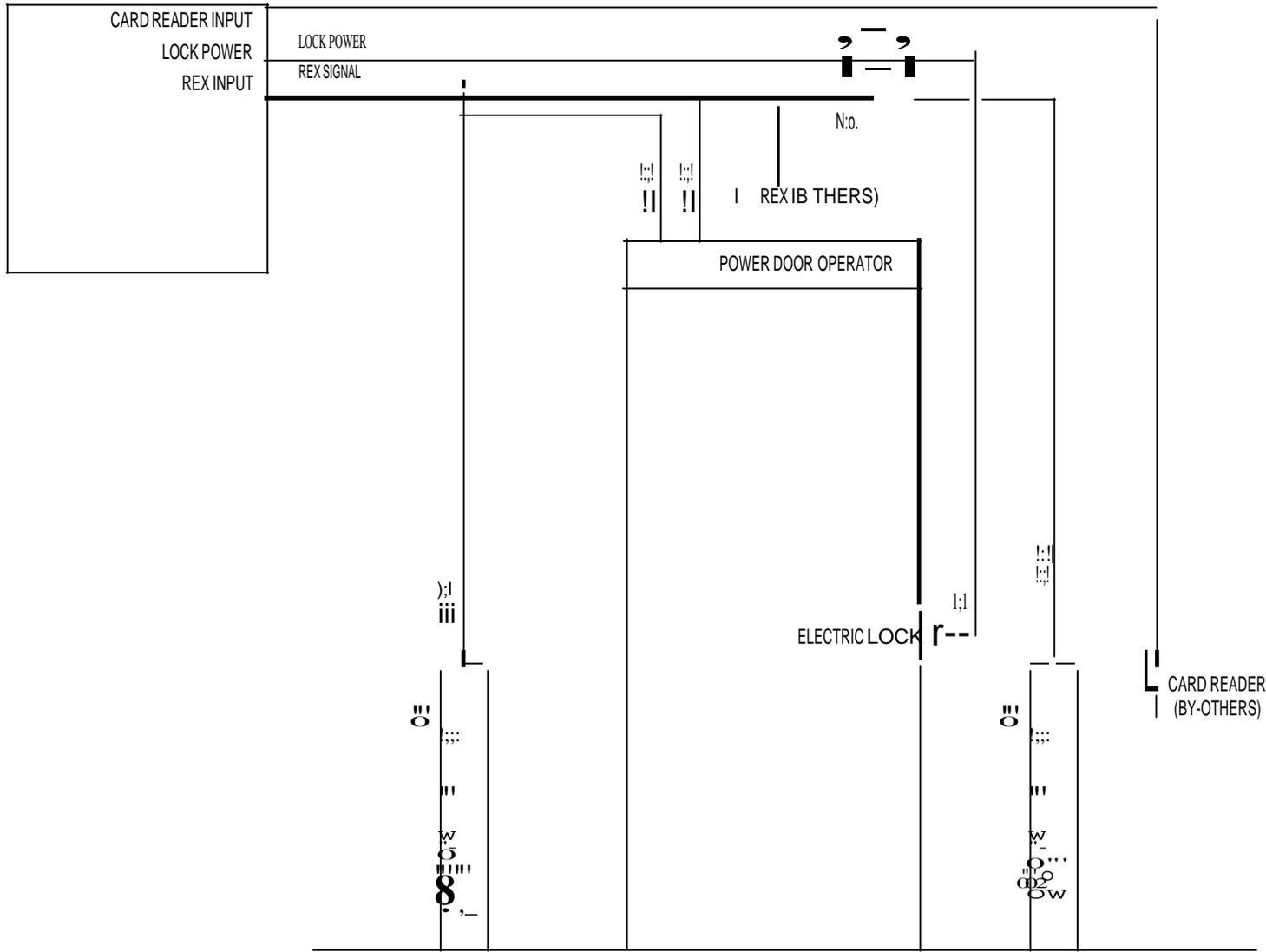
- b. Supply and install a relay module, which upon validating an access request, will enable the exterior door actuator button

CARD ACCESS PANEL (BY-OTHERS)

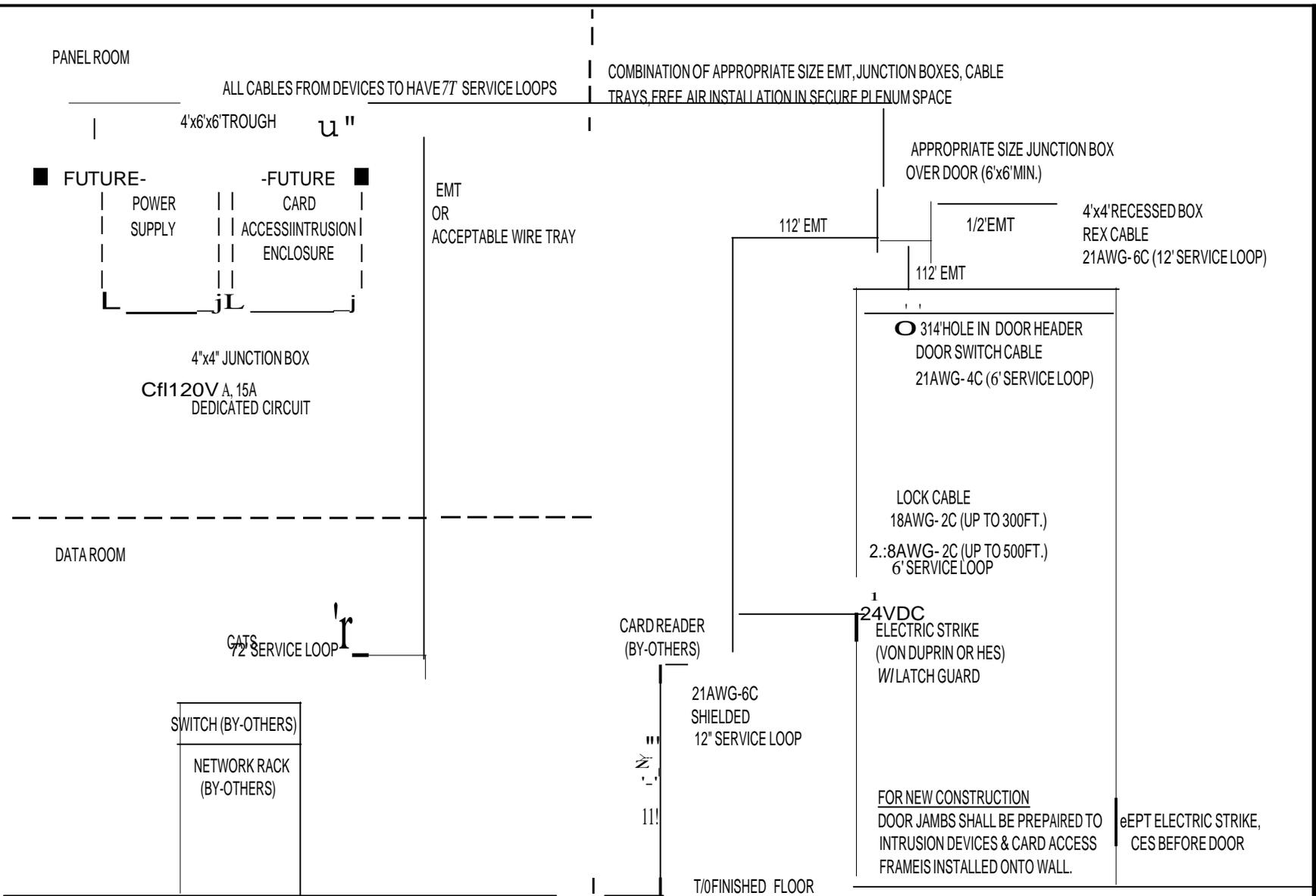


				 THE CITY OF WINNIPEG PLANNING, PROPERTY AND DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3•65 GARRY STREET, R3C 4K4			SPECIFICATION DETAIL INTEGRATION OF AUTOMATED DOOR OPERATORS & CARD ACCESS		SHEET TITLE SIGNALS DIAGRAM SCENARIO 1	
				DRAWN BY: DTA	DESIGNED BY: MK	APPROVED BY:	REFERENCE SPEC. No: PPD281328	DATE: 2013.03.06 eFILE: SIJ.I/PD-001.pdf	SCALE: NIA	SHEET No: iSD-PPD-001
No.	REVISION/DESCRIPTION	BY	DATE	PROJECT No:						

CARD ACCESS PANEL (BY-OTHERS)



				 THE CITY OF WINNIPEG PLANNING, PROPERTY AND DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3- 65 GARRY STREET, R3C 4K4			SPECIFICATION DETAIL INTEGRATION OF AUTOMATED DOOR OPERATORS & CARD ACCESS		SHEET TITLE SIGNALS DIAGRAM SCENARIO02	
				DRAWN BY: DTA	DESIGNED BY: MK	APPROVED BY:	REFERENCE SPEC. No: PPD281328	DATE: 2013.03.06 eFILE: SIJ.IPD-002.pdf	SCALE: NIA	SHEET No: SD-PPD-002
No.	REVISION/DESCRIPTION	BY	DATE							

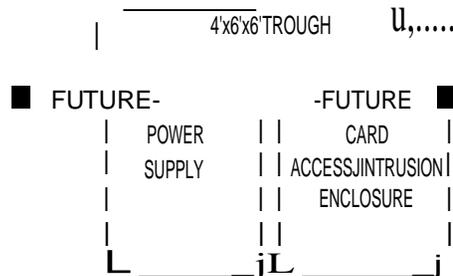


				THE CITY OF WINNIPEG PLANNING, PROPERTY AND DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3-65 GARRY STREET, R3C 4K4			SPECIFICATION DETAIL REGULAR CARD ACCESS DOOR		SHEET TITLE SIGNALS DIAGRAM SCENARI03	
				DRAWN BY: DTA	DESIGNED BY: MK	APPROVED BY:	REFERENCE SPEC. No: PPD281328	DATE: 2013.03.06 eFILE: SIJ/PPD-003.pdf	SCALE: N/A	SHEET No: SD-PPD-003
No	REVISION/DESCRIPTION	BY	DATE							

PANEL ROOM

ALL CABLES FROM DEVICES TO HAVE 7' SERVICE LOOPS

COMBINATION OF APPROPRIATE SIZE EMT, JUNCTION BOXES, CABLE TRAYS, FREE AIR INSTALLATION IN SECURE PLENUM SPACE



4"x4" JUNCTION BOX
Cf1120V A, 15A
DEDICATED CIRCUIT

EMT OR ACCEPTABLE WIRE TRAY

DATA ROOM

CATS
72 SERVICE LOOP

SWITCH (BY-OTHERS)

NETWORK RACK (BY-OTHERS)

APPROPRIATE SIZE JUNCTION BOX OVER DOOR (6'x6' MIN.)

1/2 EMT

1/2 EMT

1/2 EMT

1" HOLE

314' LE IN DOOR HEAD
DOOR SWITCH CABLE
22AWG-4C (6' SERVICE LOOP)

READER CABLE

2AWG-6C
6" SERVICE LOOP

1" HOLE

24VDC
ELECTRIC STRIKE
(VON DUPRIN OR HES)
W/ LATCH GUARD

LOCK CABLE
18AWG-2C (UPTO 300FT.)
16AWG-2C (UPTO 500FT.)
6' SERVICE LOOP

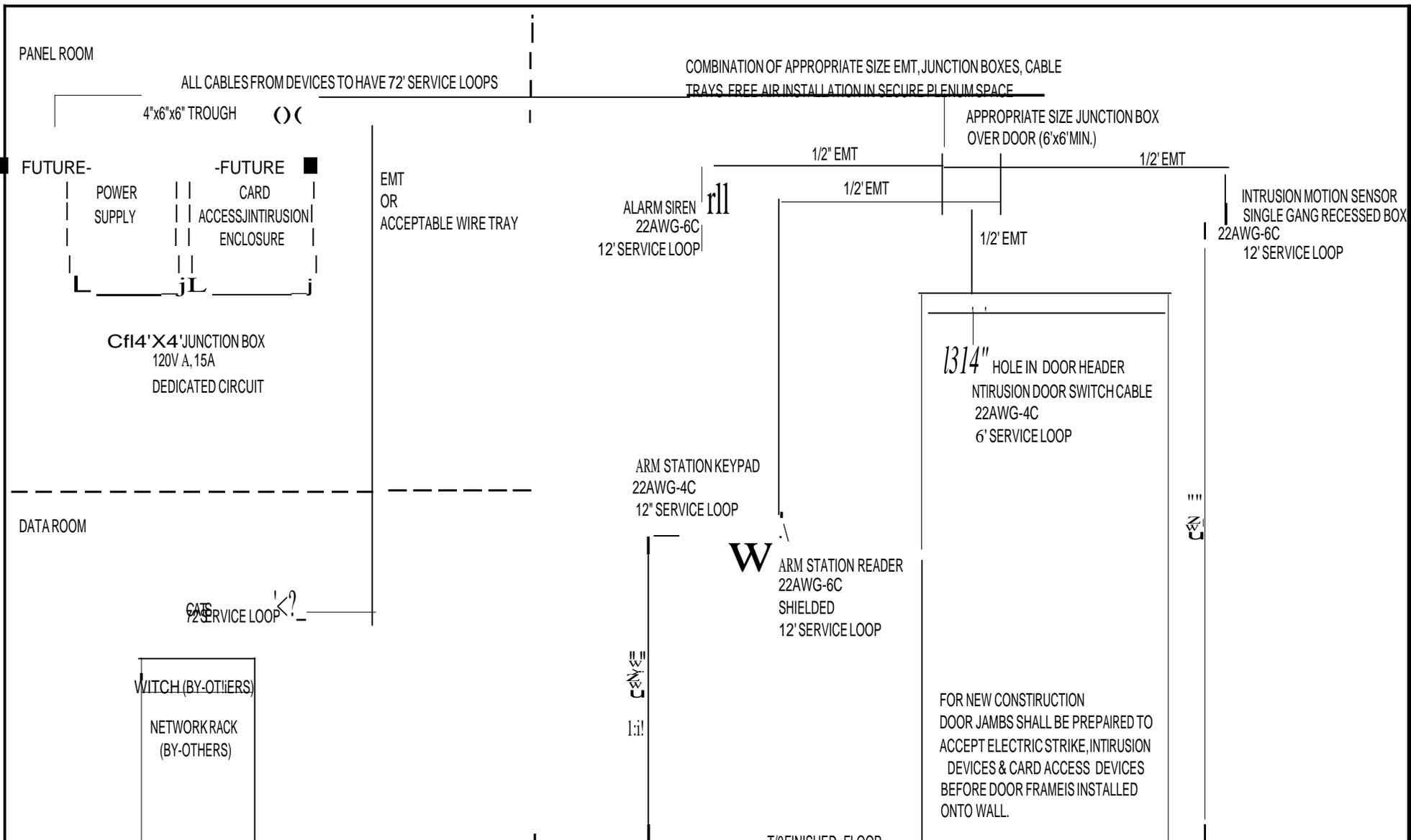
FOR NEW CONSTRUCTION

DOOR JAMBS SHALL BE PREPARED TO
INTRUSION DEVICES & CARD ACCESS
FRAME IS INSTALLED ONTO WALL.

PREPARE ELECTRIC STRIKE,
CES BEFORE DOOR

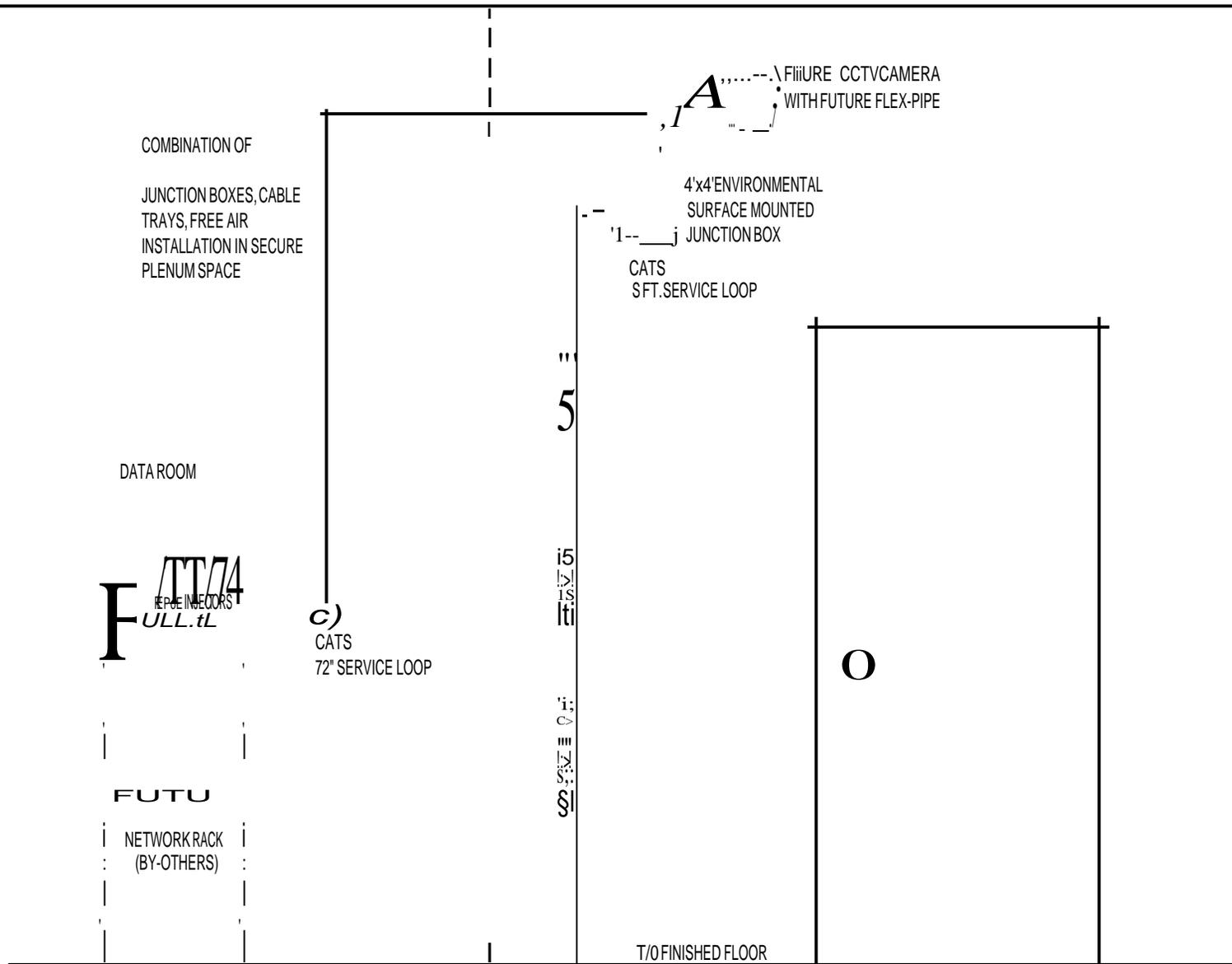
T/O FINISHED FLOOR

				THE CITY OF WINNIPEG PLANNING, PROPERTY AND DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3- 65 GARRY STREET, R3C 4K4			SPECIFICATION DETAIL CARD ACCESS DOOR WITH MULLION MOUNTED CARD READER & REX SENSOR			SHEET TITLE SIGNALS DIAGRAM SCENARIO04		
				DRAWN BY:	DESIGNED BY:	APPROVED BY:	REFERENCE SPEC. No:	DATE: 2013.03.06	SCALE: NIA	SHEET No:		
No.	REVISION/DESCRIPTION	BY	DATE	DTA	MK		PPD281328	eFILE: SJJ.IPD-004.pdf	PROJECT No:	1 SD-PPD-004		



				THE CITY OF WINNIPEG PLANNING, PROPERTY AND DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3 - 65 GARRY STREET, R3C 4K4		SPECIFICATION DETAIL NON-CARD ACCESS DOOR WITH INTRUSION DOOR SWITCH & SECONDARY PROTECTION DEVICE (MOTION SENSOR), ALARM SIREN & CARD ACCESS ARMING STATION (READER & KEYPAD)		SHEET TITLE SIGNALS DIAGRAM SCENARIOS	
DRAWN BY:		DESIGNED BY:		APPROVED BY:		REFERENCE SPEC. No:	DATE: 2013.03.06	SCALE: N/A	SHEET No:
No.		REVISION/DESCRIPTION		BY		DATE		PROJECT No:	
		DTA		MK		PPD281328		eFILE: SIU/PPD-006.pdf	

SD-PPD-006




 THE CITY OF WINNIPEG
 PLANNING, PROPERTY AND
 DEVELOPMENT DEPARTMENT
 MUNICIPAL ACCOMMODATIONS DIVISION
 3 • 65 GARRY STREET, R3C 4K4

SPECIFICATION DETAIL
 ROUGH-IN FOR PoE CCTV CAMERA

SHEET TITLE
 SIGNALS DIAGRAM
 SCENARIO?

DRAWN BY: DTA DESIGNED BY: MK APPROVED BY:	REFERENCE SPEC. No:	DATE: 2013.03.05 eFILE: SIJ.IPD-007.pdf	SCALE: NIA PROJECT No:	SHEET No: SD-PPD-007
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No. | REVISION/DESCRIPTION | BY | DATE |

1 GENERAL

1.1 RELATED WORK

- .1 General provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications.
- .2 The requirements of this section apply to Fire and Life Safety Systems specified elsewhere in the specification: Coordinate with Mechanical Divisions for interface to mechanical systems.

1.2 REFERENCES

- .1 CAN/ULC-S524-06 Installation of Fire Alarm Systems.
- .2 ULC-S525-07 Audible Signal Appliances, Fire Alarm.
- .3 CAN/ULC-S527-11 Control Units, Fire Alarm.
- .4 CAN/ULC-S528-05 Manual Pull Stations, Fire Alarm.
- .5 CAN/ULC-S529-09 Smoke Detectors, Fire Alarm.
- .6 CAN/ULC-S530-99 Heat Actuated Fire Detectors, Fire Alarm.
- .7 CAN/ULC-S531-02 Smoke Alarms.
- .8 CAN/ULC-S536-04 Inspection and Testing of Fire Alarm Systems.
- .9 CAN/ULC-S537-04 Verification of Fire Alarm Systems.
- .10 CAN/ULC-S561-03 Installation and Services for Fire Signal Receiving Centres and Systems.
- .11 NBC 2010- National Building Code of Canada.
- .12 MBC-2010 Manitoba Building Code.

1.3 DESCRIPTION OF SYSTEM

- .1 Included in this work:
 - .1 Microprocessor control panel to carry out fire alarm and protection functions including receiving alarm signals, actuating zone annunciators, initiating alarm, supervising system continuously, performing fire control functions, and initiating trouble signals.
 - .2 Periodic 24 hour automatic background test.
 - .3 Intelligent environmental compensation.
 - .4 History logging system.

- .5 System degrade operation.
- .6 Trouble signal devices.
- .7 Power supply facilities.
- .8 Manual alarm stations c/w audible covers.
- .9 Automatic alarm initiating devices.
- .10 Audible signal devices c/w protective cages in multi-purpose rooms.
- .11 End of line devices.
- .12 Visual alarm signal devices c/w protective cages in multi-purpose rooms.
- .13 Standby batteries.
- .14 Two (2) dry contacts for *Metasys* system.
 - .1 One for Main Panel Alarm.
 - .2 One for Trouble Signal.
- .15 LCD or LED display annunciator.
- .16 Compare program system software verification feature.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System:
 - .1 Subject to approval by local authority having jurisdiction.

1.5 SHOP DRAWINGS

- .1 Submittal to include:
 - .1 Data sheets on all equipment used.
 - .2 Sequence of operation.
 - .3 Layout of equipment.
 - .4 Zoning.
 - .5 Component wiring diagrams.
 - .6 Riser diagram showing all equipment and size, type and number of all required conductors.

1.6 OWNER'S MANUAL

- .1 Provide 3 copies of as-built owner's manual including the following:

- .1 System sequence of operation.
- .2 Operation instructions.
- .3 Approved data sheets of all the equipment components.
- .4 As built riser diagram.
- .5 Hard copy of final system programming including logic functions.
- .6 Verification report on CFAA forms as filled by CFAA certified technician.

1.7 MAINTENANCE

- .1 Provide one year's free maintenance with two inspections by the manufacturer's CFAA certified technicians during the year. Inspection tests to conform to CAN/ULC-S536-04.

1.8 TRAINING

- .1 Provide 4 hours of on-site lecture and demonstration by fire alarm manufacturer to train operational personnel in the use and maintenance of the fire alarm system.

1.9 SEQUENCE OF OPERATION

- .1 Single Stage Operation and capable for two stage: Operation of any alarm initiating device to:
 - .1 Cause audible signal devices to sound throughout building continuously and visual signalling devices to operate.
 - .2 Transmit signal to fire department or central station.
 - .3 Cause zone of alarm device to indicate on local LCD or LED display, including time, date and device type as well as all resulting automatic events.
 - .4 Cause air conditioning and ventilating fans and associated Fire/smoke dampers (where applicable) to shut down or to function so as to provide required control of smoke movement.
 - .5 Cause fire doors and smoke control doors, if normally held open to close automatically.

2 PRODUCTS

2.1 MATERIALS

- .1 The system and components must be supplied by one manufacturer of established reputation and experience who must have produced similar apparatus for a period of at least 20 years and who must be able to refer to similar installations rendering satisfactory service. All references to model numbers and other pertinent information herein are intended to establish minimum standards of performance, quality and construction.

- .2 Any equipment proposed as equal to that specified herein must conform to the standards herein. In addition, the Contractor must obtain the Contract Administrator's or The City's approval in writing 10 working days prior to bidding other than as specified.
- .3 The manufacturer's name, model numbers, and three copies of working drawings and engineering data sheets shall be submitted for approval along with a cross reference listing, item by item, of the specification for compliance.
- .4 Approval of other manufacturer's does not relieve the Contractor from meeting the specification requirements.
- .5 Approved manufacturers shall have in their employ factory trained employees for all sales, installation, programming, testing, verification, inspection, service, etc. Fire alarm manufacturers using outside agencies or distributors for these functions will not be accepted.
- .6 Acceptable manufacturers: Simplex, Chubb Edwards.

2.2 SYSTEM DESCRIPTION

- .1 The control panel shall be modular and network and of expandable design in construction with multi tasking microprocessor-based technology, distributed processing, and include a watchdog circuit per individual module processor to monitor the proper operation of every system processor. Systems with one watchdog circuit for all the modules are not considered equal. All components must be housed in an approved enclosure, behind a cylinder locked, removable hinge door with a viewing window. Opening of the panel door must not expose live components or wiring. The door must be easily removable without tools to prevent any obstruction to the operator during fire alarm management procedures or during system maintenance procedures.
- .2 All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.
- .3 The base system board must provide minimum one (1) class A addressable loop and space for two (2) additional class A loops, forty (40) signal circuits of 1.5 A each, one alarm relay, one trouble relay, one programmable relay, a communication network port, an alphanumeric LCD/LED annunciator driver port, an auxiliary power limited 24 VDC supply, a communication active LED, a programming port, a digitally controlled battery supervision circuit and charger.
- .4 Maximum 105 addressable devices per loop. The loop resistance shall be 100 Ohm resistance per loop
- .5 The system must be fully field-programmable. Capable of monitoring up to 500 intelligent addressable input devices. Perform any required logical sequence for fan and damper control. Provide 20 software timers accurate to one second for any required timing functions. The timers may be individually programmed from one second to four hours.
- .6 The system software must fully integrate all of the system functions including annunciation, alarm management sequence, fan and damper control.
- .7 The system must be capable of providing alarm indication in degrade mode by activating

- the addressable loop alarm led.
- .8 The total system one way response to an alarm shall be no more than 2.5 seconds on a system configured to the maximum capacity.
 - .9 The system addressable loops must be DCLA with loop isolation between fire compartments. The addressable loop must not have more than 75 intelligent addressable devices regardless of system capacity.
 - .10 The control panel shall have a two line by forty character backlit supertwist (for any required viewing angle) alphanumeric LCD display.
 - .11 An output circuit for operation of DC audible devices, or city tie, shall be provided by Controllable Signal Module Model. This module shall be capable of operating with either Class "A" or Class "B" wiring, and shall be operable by the control panel. The module shall be supervised by the control unit for open and shorted circuits. Open and short circuits shall report trouble only and respond with circuit identification. The module shall contain two (2) programmable open collector outputs capable of sourcing 250 ma at 40 VDC for relay or LED activation.
 - .12 For control of air handling units, mag locks and elevators there shall be provided a Controllable Relay Module Model. The module shall be operable by the control unit and shall be located in the main panel. It shall contain four independent relays, fitted with form "C" contacts, rated at 2 amps 28VDC/120 VAC resistive. All relays shall be supervised for coil open or shorted conditions.
 - .13 The system shall require no manual input to initialize in the event of a complete power down condition. It shall return to an on line state as an operating system performing all programmed functions upon power restoration. Systems requiring battery backed-up memory devices shall not be acceptable.
 - .14 Selectable history event logging up to 800 events, shall be stored in flash memory, displayed, or downloaded by classification for selective event reports.
 - .15 The system shall support intelligent analog smoke detection, conventional smoke detection, manual station, water flow, supervisory, security, and status monitoring devices. The system shall also support amplifiers, voice/visual circuits, and a firefighter's telephone system.
 - .16 The panel must be capable of measuring the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors.
 - .1 The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts when in the sensitivity voltage list mode.
 - .2 The control panel shall provide a display of these sensitivity measurements as a permanent record of the required sensitivity testing.
 - .3 When programmed, any system connected, ionization or light refraction style smoke detector shall be capable of automatic sensitivity drift compensation up or down. This adjustment shall keep the relationship between the sensing chamber voltage and the programmed alarm threshold voltage constant throughout the life

- of the detector to prevent false indications or failure to alarm in the presence of smoke.
- .4 The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to its pretest state.
 - .5 The system shall be capable of monitoring the state of detectors and display a message when a detector is approaching the limits of adjustment as a result of contaminants. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminants.
 - .6 The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.
- .17 The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.
- .1 Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits.
 - .2 The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition.
 - .3 Detector operation in the degrade mode shall continue at the alarm threshold previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.
- .18 The system shall be capable of reporting alarms from devices whether programmed or not. Alarm reports from these devices shall activate indicating appliance circuits.
- .19 The system shall perform time based control functions including automatic changes of specified smoke detector sensitivity settings.
- .1 Time based functions shall be controlled by specifying time periods or actual dates. It also shall provide the ability to control these functions on an exception basis using a holiday schedule.
- .20 The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test.
- .1 Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types.
 - .2 All field test activity shall be logged to the system's historical memory.
- .21 The system shall be provided with eight levels of password protection with up to forty

- passwords.
- .22 Provide a cost savings software verification Compare program. The program shall instruct the technician as to what software changes have been made from one software revision to another and what points require verification and be ULC approved.
 - .23 The system must be capable of reading and displaying at the control panel the sensitivity of remote intelligent/analog ionization and photoelectric detection devices. Individual intelligent/analog detection device alarm threshold must be adjustable form the control panel.
 - .24 The detection system must remain 100% operational and capable of responding to an alarm condition while in either routine operator maintenance mode or during programming by the manufacturer.
 - .25 Dynamic supervision of system electronics, wiring, detection devices and software must be provided by the control system. Failure of system hardware or wiring must be indicated by type and location on the alphanumeric display.
 - .26 The control mode must permit the arming and disarming of individual detection or output devices. Status of these devices must be displayed upon command from the control panel
 - .27 The address, type of device and sensitivity setting of each addressable device must be field settable by a simple programming device and stored in the addressable device in non-volatile memory. Loss of both A/C power and batteries in the control panel will not affect the system device programming.
 - .28 The system must be programmed in the field only via laptop computer. Burning of EPROMs is not acceptable. System programming must be password protected. The final system program must be available on hard copy and included in the owner's manuals.
 - .29 The alphanumeric display must be capable of listing upon request:
 - .1 Alarms and troubles with time, date and location.
 - .2 Status of output functions.
 - .3 Sensitivity of intelligent /analog smoke detectors.
 - .4 Detection device number, type and location.
 - .5 Status of remote relays.
 - .6 Acknowledgement time and date.
 - .7 Signal silence time and date.
 - .8 Reset time and date.
 - .9 Battery voltage, A/C voltage and battery charge current.
 - .30 The system must be capable of:

- .1 Counting the number of intelligent/analog devices within a "zone" which are in alarm.
 - .2 Counting "zones" which are in alarm.
 - .3 Counting the number of intelligent/analog detectors which are in alarm on the system.
 - .4 Differentiating among types of intelligent/analog detectors such as smoke detectors, manual stations, water-flow switches, thermal detectors, cross zoning, etc.
- .31 The system must have a remote LCD and graphic display annunciator, which will include the graphics of each floor area and associated alarm/trouble indication of covered all area zones of each floor. Minimum 4 graphic displays are required for all 4 floors.

2.3 POWER SUPPLY

- .1 120 VAC, 60 Hz input, 24 VDC output standby power from gel cell batteries sized as per NBC/MBC-2010 requirements.
- .2 System to include system power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. The system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.

2.4 DEVICE PROGRAMMER/TESTER

- .1 Entire system shall be programmable via built-in keyboard and RS232 portable computer link.

2.5 DEVICES

- .1 Manual alarm stations must be pull down lever, semi-flush or surface type, bilingual single stage addressable c/w audible covers.
- .2 Automatic Detectors - General:
 - .1 All intelligent and addressable ionization/photoelectronic or combo smoke detectors, thermal detectors and pull stations, remote zone module and programmable remote relays must be capable of being intermixed on the same addressable loop. All intelligent addressable detectors must be individually identifiable from the control panel and must be capable of being selected for environmental compensation via software.
 - .2 All addressable ionization smoke detectors, photoelectric smoke detectors and rate of compensation thermal detectors must mount in a plug-in, twist-lock base with screw terminals for field wiring. Pig-tails or in-line connectors must not be permitted. A concealed locking mechanism requiring a special unlocking tool must be available to prevent unauthorized removal.

- .3 All intelligent devices must be electronically programmed on site during installation. No mechanical means such as dipswitches, rotary dials or programming pins shall be used. All of the programmed information shall be capable of display, and modification from the control panel.
- .4 Remote relays located on detector bases or double gang outlets throughout the building must be controlled in the same manner as panel mounted relays and must not require a separate address.
- .3 Heat detectors:
 - .1 Fixed temperature non restorable.
 - .2 Provide rate of compensation addressable type heat detectors which mount in same bases as smoke detectors. Each to have an alarm indicating light.
- .4 Smoke detectors:
 - .1 The intelligent addressable ionization smoke detector must contain two ionization chambers and solid state alarm indicator alarm lamp. The reference chamber must compensate against sensitivity changes due to changes in environmental temperature, humidity and barometric pressure. Each must contain its own microcomputer capable of storing all of the devices programmed information provide discreet sensitivity and transmitting same in digital format to the control panel.
 - .2 The intelligent addressable photoelectronic smoke detector must contain optical sensing chamber designed to sense the presence of smoke particles produced by a wide-range of combustion sources. It includes integrated circuit which incorporates signal processing to reduce false alarms.
 - .3 It must be possible to furnish the intelligent detectors with a relay base whose relay may be made to follow the activation of the detector or may be programmed to follow any system function desired. The use of the relay base must not reduce the number of available addresses on the addressable loop.
- .5 Duct Mounted Smoke Detectors (where applicable):
 - .1 The air duct detector must operate on a cross-sectional air sampling principle to overcome stratification and the skin effect. The air duct detector must consist of a standard intelligent/analog or non-addressable detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system.
- .6 Intelligent Interface Modules:
 - .1 Provide intelligent interface modules incorporating a custom microprocessor based integrated circuit for connection of normally open or normally closed contact type devices such as water flow switches, tamper switches and OS and Y valves. Provide one for “flow” and one for “supervisory” for each sprinkler zone, confirm with sprinkler supplier.
- .7 Audible/Visual Signalling:

- .1 Horns: polarized 24 VDC, flush or surface mounted, with integrated strobe lights.
 - .2 Audible/Visual signal devices if located in refrigeration area shall be rated at minus 40 degree Celsius, minimum 110 candelas with adjustable light intensity switch.
 - .3 Audible signal devices shall be in the range 100-110 decibel (110 dB) type with temporal coded feature and adjustable decibel.
- .8 Power Pack/Booster/Synchronization module:
- .1 The units shall be standalone power supplies intended for powering fire alarm notification appliances via their own Notification Appliance Circuit(s) (NAC). The units shall be UL 864 Listed for power limited operation of their outputs and comply with NFPA 70 (NEC), article 760.
 - .2 The power supplies shall support a full 8A of notification power even if the battery is in a degraded mode and only AC power is connected.
 - .3 The power supplies shall be activated by a standard Notification Appliance Circuit (NAC) from any Fire Alarm Control Panel (FACP) or a "Dry contact" closure. The units shall be 8 ampere, 12 or 24 VDC, regulated and filtered, supervised remote power supply/chargers. The power supplies shall provide a full 8 amperes of current and shall not be battery dependent. They shall operate over the voltage range of 8 to 33 VDC or FWR. The primary application of the units shall be to expand fire alarm system capabilities for additional NAC circuits to support ADA requirements and to provide auxiliary power to support system accessories or functions. The power supplies shall provide four Class "B", two Class "A", or two Class "B" and one Class "A" NAC circuit(s).
 - .4 The units shall also supply up to 200 mA of auxiliary power that is available during both non-alarm and alarm.
 - .5 The units shall also supply auxiliary power of not less than 3.5A at 24 VDC during non-alarm. The power supplies shall be capable of charging batteries of up to 12 ampere hours per NFPA 72 (1999). Input activation options shall be from not less than two NAC circuits or Dry Contact closures. These inputs shall have the capability of being directed to any combination of the four NAC circuit outputs. Each NAC circuit output shall be rated at 3 amperes for Class "B" applications or 3 amperes each for Class "A". The outputs shall be programmable to generate a steady or Temporal (Code 3) output and or a synchronized strobe or horn output. The power supplies shall provide independent loop supervision for either Class "A" or Class "B" FACP NAC circuits and shall have the capability to "steer" all alarm or trouble conditions to either incoming NAC circuit. The units shall have common output terminals. The power supplies shall be powered from a 120 VAC or 240 VAC source with a current consumption of 5 amperes max. The unit shall incorporate short circuit protection with auto reset.
 - .6 The power supply shall incorporate a built in battery charger for lead acid or gel type batteries with automatic switchover to battery backup in the event of AC power failure. The charger shall incorporate fused protection for the batteries and have the ability to report low battery and/or no battery condition(s). Standby current for battery backup shall be 100 mA max.
- .9 End of Line Devices (EOL):
- .1 Provide high impact plastic red end of line plates with screw terminations as required for all conventional circuits. The EOL devices shall be installed in

separate boxes/enclosures.

- .10 Equipment for Fire Signal Transmitter to The Monitoring Centre:
 - .1 The fire alarm signal transmitter shall be conforming to CAN/ULC S559-04 – Equipment for Fire Signal Receiving Centres and Systems.
 - .2 Alarm signal transmitting and receiving shall be conforming to section 10 of CAN/ULC S561-03 and section 5 of CAN/ULC S559-04.

3 EXECUTION

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524-06 and according to the manufacturer's requirements.
- .2 Install main control panel(s) and connect to AC emergency power supply.
- .3 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1m radius of air outlets. Maintain at least 600mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .5 Connect alarm circuits to main control panel.
- .6 Locate and install booster/synchronization modules, signal and/or visual signal devices and connect to signalling circuits. Alternate circuits for adjacent audible devices.
- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices.
- .9 Install remote annunciator panel(s) and connect to annunciator circuit wiring.
- .10 Locate and install door releasing devices where applicable.
- .11 Locate and install door mag lock releasing/interlocks. The releasing contact shall be centralized and located in the main fire alarm panel, local field relay module shall not be used and not acceptable for mag lock controls.
- .12 Locate and install elevator home coming controls.
- .13 Locate and install remote relay units to control fan shutdown.
- .14 Where applicable, connect sprinkler system alarm and supervisory switches to control panel.
- .15 Connect CO detection system to control panel.
- .16 Arrange for and make connection for Central Reporting tie-in through. Local Tel lines and/or mobile communication phone lines. The interconnection wiring from the fire alarm control unit/transponder to the fire signal receiving centre shall comply with CAN/ULC-

S561-03 and CAN/ULC-S524-06.

3.2 FIELD QUALITY

- .1 The manufacturer or his authorized representative must perform tests in accordance with CAN/ULC-S537-04.
- .2 The verifying technician must bear approval of CFAA (Canadian Fire Alarm Association). Where required by local Authorities, the verification of Fire Alarm System and the required documentation of the verification must be completed under the direction of a Professional Engineer (having license in the province and complete with seal), who through training and experience, is familiar with the installation and functional requirements of fire alarm system. The Contractor shall arrange and pay for all Engineer Fire Alarm System Verification service charges.
- .3 Provide a complete verification report on CFAA forms.
- .4 Verification shall also include but not limited to test and report of the operations of the fire alarm interlock ancillary contacts and “downstream” ancillary devices such as mag locks, door opening/releasing devices, cooking appliance under commercial hood shutdown due to fire suppression release, air fan shutdown, etc.

END OF SECTION

FIRE ALARM VERIFICATION

The following document shall be dated, signed and forwarded to Tower Engineering by E.C. and G.C. upon final completion and verification of installed, fully operational Fire Alarm system as outlined in drawings and electrical specifications (including verifications/reports/certificate noted below).

This **Fire Alarm Verification** document must be submitted to Tower Engineering **PRIOR** to submitting request for 'Substantial Completion'.

Company Name: _____ Date: _____ (Electrical Contractor)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.
Attach copy of fire alarm ' VI Inspection Report ' (including actual water flow test, fan shutdown and central reporting) and fire alarm ' certificate ' from fire alarm manufacturer.

Company Name: _____ Date: _____ (General Contractor)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.

Witnessing Engineer _____ Date: _____ (Firm name)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date. Attach copy of sealed ' Witnessing Engineer's Verification Report '

Tower Consultant (Representative to sign at time of witnessing) _____ Date: _____
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.

The above does not constitute a waiver of any of the contract document requirements.

1 GENERAL

1.1 RELATED WORK

- .1 General provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications.
- .2 The requirements of this section apply to CO Detection and Alarm System specified elsewhere in the specification: Coordinate with Mechanical Divisions for interface to mechanical systems.
- .3 Intrusion alarm system or building automation system capable of CO detection may be used as long as the systems conform the requirement outlined in this document.
- .4 The CO detection system shall be conforming to NFPA-720 2009.

1.2 REFERENCES

- .1 NFPA 720 2009 Standard for Installation of Carbon Monoxide (CO) Detection and Warning Equipment
- .2 Manitoba Building Code (MBC) latest edition.
- .3 UL Standard 2075 Standard for Gas and Vapor Detectors and Sensors.

1.3 DESCRIPTION OF SYSTEM

- .1 Included in this work:
 - .1 Microprocessor control panel to carry out CO detection and alarm and protection functions including receiving alarm signals, actuating zone annunciators, initiating alarm, supervising system continuously and initiating trouble signals.
 - .2 Periodic 24 hour automatic background test.
 - .3 Intelligent environmental compensation.
 - .4 History logging system.
 - .5 System degrade operation.
 - .6 Trouble signal devices.
 - .7 Power supply facilities.
 - .8 Automatic CO alarm initiating devices.
 - .9 Audible signal devices.
 - .10 End of line devices.
 - .11 Visual alarm signal devices.

- .12 Standby batteries.
- .13 Auxiliary control.
- .14 Separate Auxiliary inputs loops for mechanical system monitoring.
- .15 Additional five (5) Separate alarm contacts outputs for mechanical system. Refer to mechanical specifications for detailed requirement.
- .16 Event recording printer (optional).
- .17 Compare program system software verification feature.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System:
 - .1 Shall be ULC/CSA listed and subject to approval by local authority having jurisdiction.

1.5 SHOP DRAWINGS

- .1 Submittal to include:
 - .1 Data sheets on all equipment used.
 - .2 Sequence of operation.
 - .3 Layout of equipment.
 - .4 Zoning.
 - .5 Component wiring diagrams.
 - .6 One line riser diagram showing all equipment and size, type and number of all required conductors.

1.6 OWNER'S MANUAL

- .1 Provide 3 copies of as-built owner's manual including the following:
 - .1 System sequence of operation.
 - .2 Operation instructions.
 - .3 Approved data sheets of all the equipment components.
 - .4 As built riser diagram.
 - .5 Hard copy of final system programming including logic functions.
 - .6 Verification report as specified in NFPA-720 as filled by certified technician.

1.7 MAINTENANCE

- .1 Provide one year's free maintenance with two inspections by the manufacturer's certified technicians during the year. Inspection tests to conform to NFPA-720-2009.

1.8 TRAINING

- .1 Provide 10 hours of on site lecture and demonstration by CO detection system manufacturer to train operational personnel in the use and maintenance of the system.

1.9 SEQUENCE OF OPERATION

- .1 Single Stage Operation: Operation of any alarm initiating CO detector device to:
 - .1 Cause audible signal devices to sound throughout building continuously and visual signalling devices to operate. Audible signals shall be temporal coded distinctive from fire alarm signals as specified in NFPA-720, clause 5.5.6.5 (Distinctive Signal). It allows occupant notification to be limited to the notification zone encompassing the area where the CO signal is originated, if the CO alarm signal is transmitted to a constantly attended onsite location or off-premises location.
 - .2 Transmit signal to fire Alarm panel and/or central monitoring station.
 - .3 Cause zone of alarm device to indicate on local LCD display, remote LCD display and logging printer including time, date and device type as well as all resulting automatic events.

2 PRODUCTS

2.1 MATERIALS

- .1 The system and components must be supplied by one manufacturer of established reputation and experience who must have produced similar apparatus for a period of at least five (5) years and who must be able to refer to similar installations rendering satisfactory service. All references to model numbers and other pertinent information herein is intended to establish minimum standards of performance, quality and construction, and is based upon equipment designed and manufactured by approved manufactures.
- .2 Any equipment proposed as equal to that specified herein must conform to the standards herein. In addition, the Contractor must obtain the Contract Administrator's approval in writing ten (10) working days prior to bidding other than as specified.
- .3 The manufacturer's name, model numbers, and three copies of working drawings and engineering data sheets shall be submitted for approval along with a cross reference listing, item by item, of the specification for compliance.
- .4 Approval of other manufacturer's does not relieve the Contractor from meeting the specification requirements.
- .5 Acceptable manufacturers: System Sensor or approved equal.

- .6 Approved manufacturers shall have in their employ factory trained employees for all sales, installation, programming, testing, verification, inspection, service, etc. Manufacturers using outside agencies or distributors for these functions will not be accepted.

2.2 SYSTEM DESCRIPTION

- .1 The control panel shall be modular in construction with multi tasking microprocessor-based technology, distributed processing, and include a watchdog circuit per individual module processor to monitor the proper operation of every system processor. Systems with one watchdog circuit for all the modules are not considered equal. All components must be housed in an approved enclosure, behind a cylinder locked, removable hinge door with a viewing window. Opening of the panel door must not expose live components or wiring. The door must be easily removable without tools to prevent any obstruction to the operator during CO alarm management procedures or during system maintenance procedures.
- .2 The base system board must provide four (4) addressable loops and space for two (2) additional loops, twenty (20) signal circuits of 1.5 A each, one alarm relay, one trouble relay, one programmable relay, a communication network port, an alphanumeric LCD annunciator driver port, an auxiliary power limited 24 VDC supply, a communication active LED, a programming port, a digitally controlled battery supervision circuit and charger.
- .3 The system must be fully field programmable. Capable of monitoring up to 100 addressable input devices. Perform any required logical sequence for fan and damper control. Provide 20 software timers accurate to one second for any required timing functions. The timers may be individually programmed from one second to four hours.
- .4 The system software must fully integrate all of the system functions including annunciation, alarm management sequence, fan and damper control.
- .5 The system must be capable of providing alarm indication in degrade mode by activating the addressable loop alarm led.
- .6 The total system one way response to an alarm shall be no more than 2.5 seconds on a system configured to the maximum capacity.
- .7 The system addressable loops must be DCLA or DCLC with loop isolation between CO detection zone as specified in NFPA-720. The addressable loop must not have more than 48 intelligent addressable devices regardless of system capacity.
- .8 The control panel shall have a two line by forty character backlit supertwist (for any required viewing angle) alphanumeric LCD display.
- .9 Detection line circuit monitoring shall be provided by a Conventional Zone Module Model. Each circuit shall be capable of Class "A" or Class "B" wiring. Each zone shall accommodate up to thirty (30) detectors, as well as any quantity of shorting type contact devices.
- .10 An output circuit for operation of DC audible devices, or city tie, shall be provided by Controllable Signal Module Model. This module shall be capable of operating with either Class "A" or Class "B" wiring, and shall be operable by the control panel. The module

shall be supervised by the control unit for open and shorted circuits. Open and short circuits shall report trouble only and respond with circuit identification. The module shall contain two (2) programmable open collector outputs capable of sourcing 250 ma at 40 VDC for relay or LED activation.

- .11 The system shall require no manual input to initialize in the event of a complete power down condition. It shall return to an on line state as an operating system performing all programmed functions upon power restoration. Systems requiring battery backed-up memory devices shall not be acceptable.
- .12 Selectable history event logging up to 800 events, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports.
- .13 The system shall support intelligent CO detection.
- .14 The panel must be capable of measuring the sensitivity of connected intelligent CO detectors.
 - .1 The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts when in the sensitivity voltage list mode.
 - .2 The control panel shall provide a display and a printed list of these sensitivity measurements as a permanent record of the required sensitivity testing.
 - .3 The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to its pretest state.
 - .4 The system shall be capable of monitoring the state of detectors and display a message when a detector is approaching the limits of adjustment as a result of contaminants. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminants.
 - .5 The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.
- .15 The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.
 - .1 Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits.
 - .2 The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition.
 - .3 Detector operation in the degrade mode shall continue at the alarm threshold

previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.

- .16 The system shall be capable of reporting alarms from devices whether programmed or not. Alarm reports from these devices shall activate indicating appliance circuits.
- .17 The system shall perform time based control functions including automatic changes of specified CO detector sensitivity settings.
 - .1 Time based functions shall be controlled by specifying time periods or actual dates. It also shall provide the ability to control these functions on an exception basis using a holiday schedule.
- .18 The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test.
 - .1 Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types.
 - .2 All field test activity shall be logged to the system printer and historical memory.
- .19 The system shall be provided with eight levels of password protection with up to forty passwords.
- .20 Provide a cost savings software verification Compare program. The program shall instruct the technician as to what software changes have been made from one software revision to another and what points require verification and be ULC approved.
- .21 The system must be capable of reading and displaying at the control panel the sensitivity of remote intelligent/analog ionization and photoelectric detection devices. Individual intelligent/analog detection device alarm threshold must be adjustable from the control panel.
- .22 The detection system must remain 100% operational and capable of responding to an alarm condition while in either routine operator maintenance mode or during programming by the manufacturer.
- .23 Dynamic supervision of system electronics, wiring, detection devices and software must be provided by the control system. Failure of system hardware or wiring must be indicated by type and location on the alphanumeric display.
- .24 The control mode must permit the arming and disarming of individual detection or output devices. Status of these devices must be displayed upon command from the control panel
- .25 The address, type of device and sensitivity setting of each addressable device must be field settable by a simple programming device and stored in the addressable device in non-volatile memory. Loss of both A/C power and batteries in the control panel will not affect the system device programming.
- .26 The system must be programmed in the field only via laptop computer. Burning of EPROMs is not acceptable. System programming must be password protected. The final system program must be available on hard copy and included in the owner's manuals.

- .27 The printer and/or alphanumeric display must be capable of listing upon request:
 - .1 Alarms and troubles with time, date and location.
 - .2 Status of output functions.
 - .3 Sensitivity of intelligent /analog CO detectors.
 - .4 Detection device number, type and location.
 - .5 Status of remote relays.
 - .6 Acknowledgement time and date.
 - .7 Signal silence time and date.
 - .8 Reset time and date.
 - .9 Battery voltage, A/C voltage and battery charge current.
- .28 The system must be capable of:
 - .1 Counting the number of intelligent/analog devices within a "zone" which are in alarm.
 - .2 Counting "zones" which are in alarm.
 - .3 Counting the number of intelligent/analog detectors which are in alarm on the system.

2.3 POWER SUPPLY

- .1 120 VAC, 60 Hz input, 24 VDC output standby power from gel cell batteries sized as per NBC/MBC-2010 requirements.
- .2 System to include system power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. The system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.

2.4 DEVICE PROGRAMMER/TESTER

- .1 Entire system shall be programmable via built-in keyboard and RS232 portable computer link.

2.5 DEVICES

- .1 Automatic Detectors - General:
 - .1 All intelligent CO detectors, remote zone module and programmable remote relays must be capable of being intermixed on the same addressable loop. All

intelligent/analog detectors must be individually identifiable from the control panel and must be capable of being selected for environmental compensation via software.

- .2 All addressable CO detectors must mount in a plug-in, twist-lock base with screw terminals for field wiring. Pig-tails or in-line connectors must not be permitted. A concealed locking mechanism requiring a special unlocking tool must be available to prevent unauthorized removal.
 - .3 All intelligent/analog devices must be electronically programmed on site during installation. No mechanical means such as dipswitches, rotary dials or programming pins shall be used. All of the programmed information shall be capable of display, printout and modification from the control panel.
 - .4 Remote relays located on detector bases or double gang outlets throughout the building must be controlled in the same manner as panel mounted relays and must not require a separate address.
- .2 CO detectors:
- .1 The intelligent detector must contain either Metal Oxide Semiconductor or Electrochemical (platinum/Acid combination) sensing technologies. Each must contain its own microcomputer capable of storing all of the devices programmed information provide discreet sensitivity and transmitting same in digital format to the control panel.
 - .2 It must be possible to furnish the intelligent detectors with a relay base whose relay may be made to follow the activation of the detector or may be programmed to follow any system function desired. The use of the relay base must not reduce the number of available addresses on the addressable loop.
- .3 Audible/Visual Signalling:
- .1 Horn/Strobe: polarized 24 VDC, flush or surface mounted, 250 mm, with integrated strobe lights, minimum 85dB. The horn sound shall be distinctive from Fire Alarm Signal alarm sound, and temporal coded as specified in NFPA-720. The horn/strobe device shall be distinctive from fire alarm signaling device and conforming to NFPA 720 standard.
- .4 End of Line Devices:
- .1 Provide high impact plastic end of line plates with screw terminations as required for all circuits. Provide separate enclosure/box for end of line device.

3 EXECUTION

3.1 INSTALLATION

- .1 Install systems in accordance with NFPA-720, and according to the manufacturer's requirements.
- .2 Coordinate with mechanical division for exact location of the CO detector locations.

- .3 Install main control panel(s) and connect to AC emergency power supply.
- .4 Locate and install CO detectors and connect to alarm circuit wiring.
- .5 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1m radius of air outlets. Maintain at least 600mm radius clear space on ceiling, below and around detectors
- .6 Connect alarm circuits to main control panel.
- .7 Locate and install signal and/or visual signal devices and connect to signalling circuits. Alternate circuits for adjacent audible devices.
- .8 Connect signalling circuits to main control panel.
- .9 Install end-of-line devices.
- .10 Install remote annunciator panel(s) and connect to annunciator circuit wiring.
- .11 Locate and install remote relay units to control fan.
- .12 Arrange for and make connection for Central Reporting tie-in through. Local Tel lines. The interconnection wiring from the CO detection control unit/transponder to the fire signal receiving centre shall comply with NFPA-720.
- .13 Arrange for and make connection between CO detection system and the building Fire Alarm Panel (if fire alarm panel is required).

3.2 FIELD QUALITY

- .1 The manufacturer or his authorized representative must perform tests in accordance with NFPA-720.
- .2 The verifying technician must bear approval as specified in NFPA-720.
- .3 Provide a complete verification report on forms as specified in NFPA-720.

END OF SECTION